

**PATENT**

Attorney Docket No.: AMAT/7669.P1/CMP/ECP/RKK

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**What is claimed is:**

1. An electrochemical plating system, comprising:
  - a substrate loading station positioned in communication with a mainframe processing platform;
  - at least one substrate plating cell positioned on the mainframe;
  - at least one substrate bevel cleaning cell positioned on the mainframe;and
  - a stacked substrate annealing station positioned in communication with at least one of the mainframe and the loading station, each chamber in the stacked substrate annealing station having a substrate heating plate and a substrate cooling plate adjacently positioned therein.
2. The system of claim 1, comprising at least one spin rinse dry cell positioned on the mainframe in a substrate transfer path between the at least one substrate plating cell and the substrate loading station.
3. The system of claim 2, wherein the at least one spin rinse dry cell comprises:
  - a cell bowl having an upstanding cylindrical wall;
  - an annular and inwardly curving pressure reducing surface positioned on a top portion of the upstanding cylindrical wall;
  - a fluid receiving shield extending radially inward from an upper portion of the upstanding cylindrical wall;
  - a rotatable substrate support member centrally positioned in the cell bowl;and
  - a fluid dispensing nozzle configured to dispense a rinsing solution onto an upper surface of a substrate positioned on the support member.
4. The system of claim 1, wherein the at least one plating cell comprises:
  - a plating cell bowl having an overflow weir;
  - an anode positioned in the cell bowl;

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an ionic membrane positioned across the cell bowl between the anode and the overflow weir; and

a diffusion member positioned across the cell bowl between the membrane and the overflow weir.

5. The system of claim 4, wherein the diffusion member comprises a fluid permeable porous ceramic member.

6. The system of claim 4, wherein the membrane comprises a cationic membrane.

7. The system of claim 6, wherein the plating cell comprises:

a catholyte fluid inlet positioned to dispense a catholyte solution into a volume between the membrane and the overflow weir; and

an anolyte fluid inlet positioned to dispense an anolyte solution into a volume in the cell bowl below the membrane.

8. The system of claim 1, wherein the a stacked substrate annealing station comprises a substrate transfer robot positioned adjacent the heating plate and the cooling plate, the substrate transfer robot being configured to transfer a substrate between the heating plate and the cooling plate.

9. The system of claim 1, wherein the at least one substrate bevel cleaning cell comprises:

a substrate centering assembly;

a rotatable substrate support member; and

a fluid dispensing nozzle positioned to dispense an etchant solution onto an exclusion zone of a substrate being processed in the bevel cleaning cell.

10. The system of claim 9, wherein the substrate centering assembly comprises a plurality of cooperatively rotatable substrate support centering pins, each of the substrate support centering pins having a raised substrate support

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portion positioned on a vertical axis of the centering pin and an eccentrically positioned substrate centering post.

11. The system of claim 1, comprising a fluid delivery system, the fluid delivery system being configured to supply at least two plating chemistries to the plating cells.

12. The system of claim 11, comprising a baffled catholyte tank in fluid communication with a catholyte chamber of the at least one plating cell and the fluid delivery system and an anolyte tank in fluid communication with an anolyte chamber of the at least one plating cell.

13. A multi-chemistry plating system, comprising:  
a plurality of plating cells positioned on a common platform;  
a cleaning cell positioned on the platform;  
an annealing chamber positioned in communication with the platform; and  
a multi-chemistry fluid delivery system positioned in communication with the platform and in fluid communication with the plurality of plating cells, the fluid delivery system being configured to mix and distribute a plurality of fluid solutions to each of the plurality of plating cells.

14. The plating system of claim 13, wherein the plurality of plating cells comprise at least one electrochemical plating cell.

15. The plating system of claim 13, wherein the plurality of plating cells comprise a combination of electrochemical plating cells and electroless plating cells.

16. The plating system of claim 14, wherein the electrochemical plating cell comprises:

- an overflow weir positioned at a top portion of a cell bowl;
- an anode positioned in the cell bowl;

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an ionic membrane positioned between the anode and the overflow weir;  
and

a diffusion member positioned between the membrane and the overflow weir.

17. The plating system of claim 16, wherein the ionic membrane further comprises a cationic membrane configured to separate the plating cell into an anolyte compartment below the membrane and a catholyte compartment above the membrane.

18. The plating system of claim 17, wherein the multi-chemistry fluid delivery system is configured to supply a catholyte plating solution to the catholyte compartment and an anolyte solution to the anolyte compartment.

19. The plating system of claim 13, wherein the cleaning cell comprises a substrate spin rinse dry cell.

20. The plating system of claim 13, wherein the cleaning cell comprises a substrate bevel clean cell.

21. The plating system of claim 20, wherein the bevel clean cell comprises:  
a rotatable vacuum chuck;  
a plurality of substrate centering posts positioned radially outward of the vacuum chuck; and  
a movable fluid dispensing nozzle positioned to dispense an etchant solution onto a bevel of a substrate positioned on the vacuum chuck.

22. The plating system of claim 21, wherein the plurality of substrate centering posts comprise a raised substrate support portion positioned on a longitudinal axis of the centering post and an eccentrically positioned centering post.

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23. The plating system of claim 22, wherein the plurality of substrate centering posts are cooperatively movable via an actuator.

24. The plating system of claim 13, wherein the cleaning cell comprises at least one substrate spin rinse dry cell and at least one substrate bevel clean cell.

25. The plating system of claim 13, wherein the annealing chamber comprises a stacked annealing system, each annealing chamber in the stack comprising a heating plate, a cooling plate, and a gas distribution nozzle.

26. An electrochemical plating system, comprising:  
a central mainframe having a substrate transfer robot positioned thereon;  
means for mixing multiple plating chemistries in communication with the mainframe;  
a plurality of electrochemical plating cells positioned on the mainframe;  
means for delivering multiple chemical solutions to each of the plurality of electrochemical plating cells, the means for delivering being in fluid communication with the means for mixing;  
means for removing unwanted deposits from a bevel of a substrate;  
means for rinsing and drying the substrate; and  
means for annealing the substrate.

27. The plating system of claim 26, wherein the means for removing comprises a substrate bevel clean cell having a rotatable substrate support member and a plurality of substrate centering posts positioned radially outward of the support member.

28. The plating system of claim 26, wherein the means for annealing comprises an annealing stack, wherein each annealing chamber in the annealing stack comprises a heating plate and a cooling plate.

29. An electrochemical plating system, comprising:

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an electrochemical plating cell positioned on a processing platform, the electrochemical plating cell comprising:

a cell body configured to contain a plating solution and having an overflow weir positioned thereon;

an anode positioned in the cell body;

an ionic membrane positioned across the cell body at a position above the anode and below the overflow weir, the ionic membrane separating an anolyte compartment below the membrane from a catholyte compartment above the membrane; and

a porous diffusion member positioned in the cell body above the membrane and below the overflow weir;

a substrate cleaning cell positioned on the processing platform; and

a stacked substrate annealing station positioned in communication with the processing platform.

30. The plating system of claim 29, wherein the substrate cleaning cell comprises at least one of a substrate spin rinse dry cell and a substrate bevel clean cell.

31. The plating system of claim 29, wherein the stacked substrate annealing station comprises a plurality of stacked annealing chambers, each of the stacked annealing chambers comprising:

a heating plate positioned in the chamber;

a cooling plate positioned in the chamber;

a substrate transfer robot positioned to transfer substrates between the heating plate and the cooling plate; and

a gas dispensing nozzle in fluid communication with an interior of the chamber.

32. The plating system of claim 29, comprising a multi-chemistry fluid delivery system in fluid communication with the anolyte compartment and the catholyte compartment.